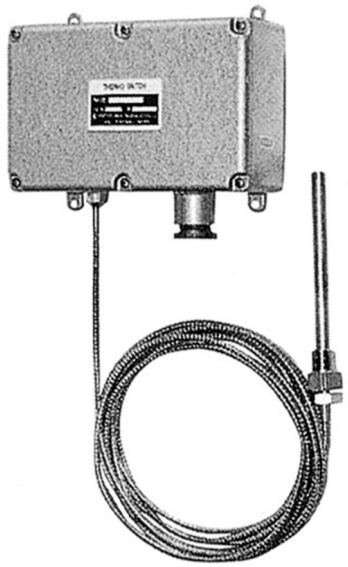


TS50 Series Temperature Switch

OUTLINE

This temperature switch consists of a temperature element and a switch.
The pressure type temperature element, in which liquid is charged and its expansion and contraction are applied, is used.
This temperature switch is classified into the non-mercury organic liquid filled type and the mercury filled type.
Additionally, a microswitch for industrial application is used, and this catalog is formed by classifying this temperature switch into the drip-proof type according to the construction of the case.

* When selecting a thermometer, select a thermometer which is normally applied to a temperature range of 30% to 60% of full span. Check to confirm that the material of the wetted parts is appropriate to measuring gas or liquid.

SPECIFICATION

Manufacturing temperature range :
Liquid filled type —70℃～300℃

Use switch :
Industrial switch

Construction :
Drip-proof type

Mounting :
Remote type, surface mounting
(2B pipe mounting is available for explosion-proof type)

Bulb · Connection material :
304 st.st.

Lead tube part material :
Capillary 304 st.st. or 316st.st.
Armored tube 430 st.st. or 430st.st.+PVC

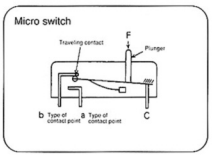
Connection :
R 1/2 (PT), R 3/4 (PT), 1/2 NPT, G 1/2 B (PF), G 3/4 B (PF)
JIS10K20ARF, JIS10K25ARF、ANSI1B150RF, ANSI1B300RF
※ For other connections, please contact us.

Number of contact :
Liquid filled type One contact, two contact

Accuracy :
Repeatability Within 2%F.S.

SELECTION GUIDE OF TEMPERATURE SWITCH 1

1. Features of micro switch



Micro switch is able to take electricity rating greatly, and is available for various control other than dispatch of warning with safety from vibration.

Electric characteristics :

Electric rating		Withstand voltage	Instlation resistance
Resistance load	Inductive load		
125VAC 15A 250VAC 15A 30VDC 2A 125VDC 0.5A	(Power factor more than 0.4 or Time-contact 7ms or less) 125VAC 15A 250VAC 15A 30VDC 1A 125VDC 0.05A	1500V AC 1 minute	500V DC megger 100MΩ over

2. Compensation system by installation place

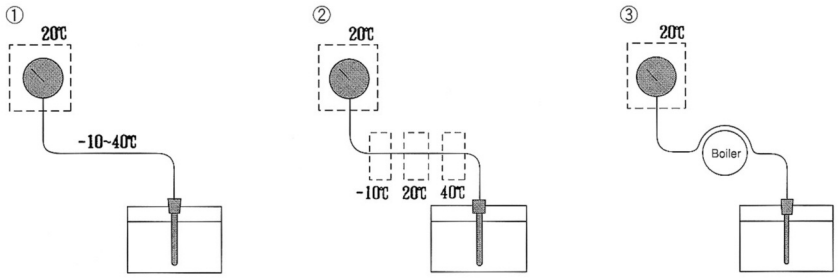
When the ambient temprature around temperature gauge changes, the filled liquid in the indicator and capillary tube also changes to expand or shrink and this causes the indication error. To compensate this error, following compensations are provided.

(1) Bimetal compensation (TS 30)

- When the temperature around indicator and lead parts changes at a same time.

(2) Lead compensation (TS 50)

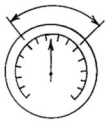
- When the ambient temperature around indicator and lead parts changes independently.
  - ①When the temperature change around indicator is small and big for lead parts or it's opposite case.
  - ②When the lead parts is under various ambient temperature condition.
  - ③When a part of lead parts is heated.



3. Temperature range (Scale range)

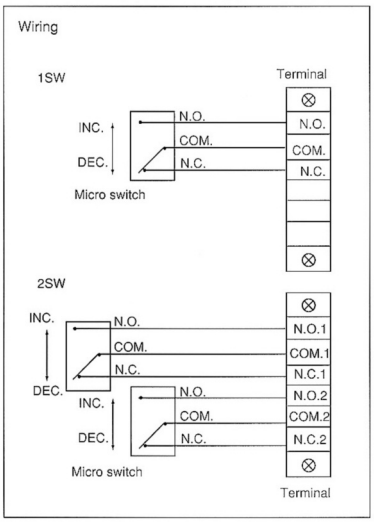
- Scale range should be selected to use normally between 30 to 60% of full span.
- When the temperature exceeds the temperature range, it may cause to break the temperature gauge. For example, if there will be a case that the gauges pass the right on the equator or cold district during transportion, or store them at cold distric, it needs careful attention.

Normal using range



TYPE OF CONTACT AND WIRING SYSTEM

TS50 (Liquid filled type)



N.O. (Normally open)	Terminal of micro switch circuit is normally open at minimum temperature
N.C. (Normally closed)	Terminal of micro switch circuit is normally closed at minimum temperature
Upper limit type with one contact H (Reverse lower limit one contact LR)	System by which the contacts close (open) when the temperature increases (decreases) to the set point. (Reverse lower limit wiring is the same as upper limit.)
Lower limit type with one contact L (Reverse upper limit type with one contact HR)	System by which the contacts close (open) when the temperature decreases (increases) to the set point. (Reverse upper limit wiring is the same as lower limit.)
Upper and lower limits two contact HL (Reverse lower and upper limits type with two contact HR, LR)	Combination of upper limit system and lower limit system. There are types whose contacts operate independently (Dual setting, dual circuits) and types whose contacts operate simultaneously (Single setting, dual circuits)
Upper limit type with two contact 2H (Reverse lower limit type with two contact 2LR)	Combination of two upper limit systems. There are types whose contacts operate independently and types (Dual setting, dual circuits) whose contacts operate simulataneously (Single setting, dual circuits)
Lower limit type with two contact 2L (Reverse upper limit type with two contact 2HR)	Combination of two upper limit systems. There are types whose contacts operate independently and types (Dual setting, dual circuits) whose contacts operate simulataneously (Single setting, dual circuits)

■Range · Bulb DIA. · Bulb length

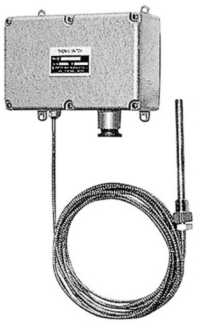
( ) wtih thermowell

Range ℃	Standard Bulb DIA.×length d (d1) × L (L)	Bulb length (L) mm					
		Minimum insertion length					Max.
		d=8 DIA. (d1=12 DIA.)	d=10 DIA. (d1=15 DIA.)	d=12 DIA.	d=13 DIA. (d1=19 DIA.)	d=16 DIA. (d1=23 DIA.)	
−70～ 50	10 (15) × 150 (200)	160 (185)	130 (155)	100	90 (115)	75 (100)	500
−70～100	× 150 (150)	125 (150)	105 (130)	85	75 (100)	65 (90)	
−50～ 50	× 150 (200)	180 (205)	145 (170)	110	100 (125)	80 (105)	
−30～ 50	× 200 (200)	215 (240)	170 (195)	130	115 (140)	95 (120)	
−20～100	× 150 (200)	160 (185)	130 (155)	100	90 (115)	75 (100)	
−10～100	× 150 (200)	170 (195)	135 (160)	105	95 (120)	80 (105)	
−10～ 50	× 300 (300)	265 (290)	210 (235)	155	135 (160)	105 (130)	
0～ 50	× 300 (300)	355 (380)	270 (295)	195	170 (195)	135 (160)	
～ 60	× 300 (300)	315 (340)	245 (270)	180	155 (180)	120 (145)	
～ 80	× 200 (300)	245 (270)	195 (220)	145	125 (150)	100 (125)	
～100	× 200 (200)	205 (230)	165 (190)	125	110 (135)	90 (115)	
～120	× 150 (200)	180 (205)	145 (170)	110	100 (125)	80 (105)	
～150	× 150 (150)	155 (180)	125 (150)	100	90 (115)	75 (100)	
～200	× 100 (150)	110 (135)	95 (120)	75	70 (95)	60 (85)	
～250	× 100 (150)	100 (125)	85 (110)	70	65 (90)	60 (85)	
～300	× 100 (150)	90 (115)	80 (105)	65	60 (85)	55 (80)	

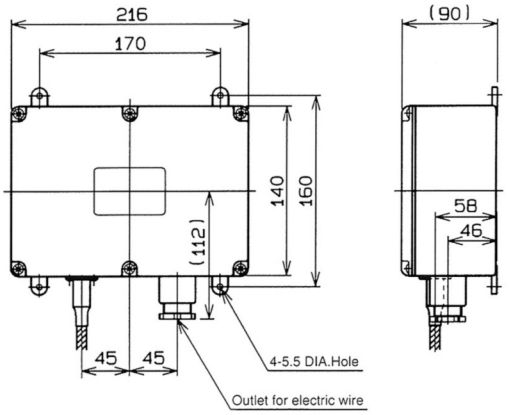
Note ●Above length is the minimum necessary length of bulb to be inserted into the fluid to be measured.
●Bulb length should be over the above length and specify 5mm steps.
●In case of plain type of bulb, minimum length to be added 40mm to the avove length.

LIQUID FILLED TYPE · TEMPERATURE SWITCHES 1

TS50 Drip-proof type



■Dimension



Weight : Approx. 2kg (Indicator)

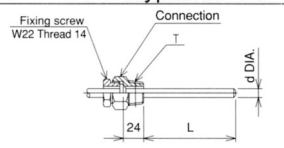
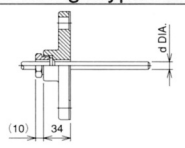
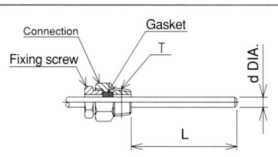
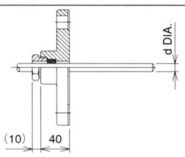
■Specification

Manufacturing range	−70～300℃		
Case	TS50 : Drip-proof · IP33 (IP65 is available) Material : TS50 · Aluminum alloy casting (AC7A)		
Weeted parts material	Bulb : 304st.st., Connection · Flange : 304st.st.		
Accuracy(Repeatability)	Within 2%F.S.		
Indication accuracy	Within ±1 dial at 20℃		
Dead band	Within 3%F.S.		
Ambient temperature error	Within ±2%F.S./15deg		
Number of contact	One contact · Two contact		
Setting system	Internal adjustment		
Lead length	Standard 3m, Max. TS50 : 10m		
Compensation	Lead compensation		
Connection	R 1/2(PT), R 3/4(PT), 1/2NPT G 1/2B(PF), G 3/4B(PF) 1/2is not available with 16 Dia. bulb and 19 Dia. 23 Dia thermowell		
Flange	JIS10K20ARF, JIS10K25ARF, ANSI1B150RF, ANSI1B300RF		
Connection	Without thermowell	Union type, Slide type	Slide type is not available with 16 Dia. bulb.
	With thermowell	Double socket union type : R 1/2, 1/2 NPT (Connection)	
		Double socket slide type : R 1/2, 1/2 NPT (Connection)	

※Other connections are available. Contact NKS for details.

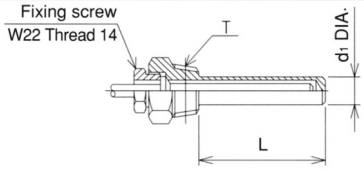
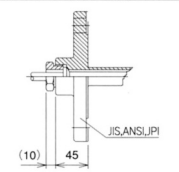
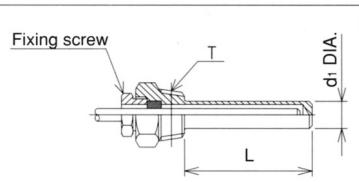
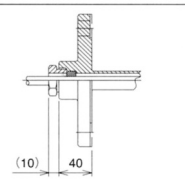
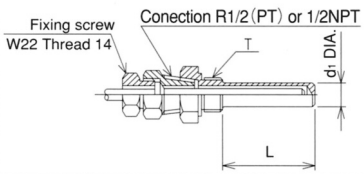
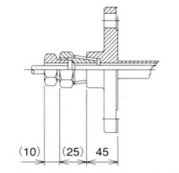
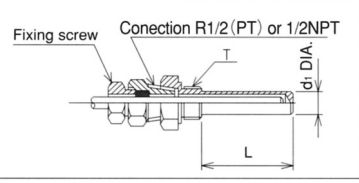
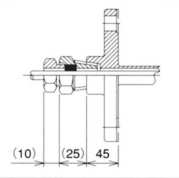
CONNECTION · BULB SPECIFICATION

1. Without thermowell

	Connection	
	Screw type	Flange type
Union type		
	Max. operating pressure : 2 MPa (20 kgf/cm²) for less than 200 ℃ 1 MPa (10 kgf/cm²) for 200 ℃ or over	
Slide type		
	Max.operating pressure 0.3 MPa (3 kgf/cm²)	

d DIA.	Note
8 DIA.	• Slide type is not available.
10 DIA.	———
12 DIA.	———
13 DIA.	———
16 DIA.	• T = 1/2 is not available. • Slide type is not available.

2. With thermowell

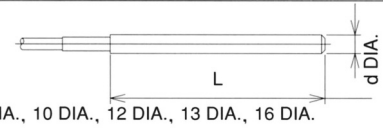
		Connection	
		Screw type	Flange type
Standard type	Union type		
	Slide type		
Double socket type	Union type		
	Slide type		

d DIA.	d DIA.	Note
12 DIA.	8 DIA.	———
15 DIA.	10 DIA.	———
19 DIA.	13 DIA.	• T = 1/2 is not available.
13 DIA.	13 DIA.	• T = 1/2 is not available. • Welding type well not available.
19 DIA. / 23 Taper	13 DIA.	• T = 1/2 is not available. • Welding type well not available.

	Screw rating	Flange rating
Standard connection	R 1/2 (PT), 1/2 NPT G 1/2 B (PF) R 3/4 (PT), G 3/4 B (PF) (Fixing screw only=W22 thread 14)	JIS 10 K 20 A R F JIS 10 K 25 A R F ANSI 1 B 150 R F ANSI 1 B 300 R F

Note
Other connections except shown left are available. Contact NKS for details.

3. Plain type

	Bulb
Plain type	 d DIA.=8 DIA., 10 DIA., 12 DIA., 13 DIA., 16 DIA.

Type No. constitution

Please specify Type No., each specification and range when ordering.

Note: For this Model, there is no applicable item for the figures X, but please specify X when ordering.

T S Drip-proof type temprature switch

Sensing mrthod

50	Liquid filled type

1 Thermowell・inner screw

0	Without thermowell
1	With thermowell：W22 thread 14 (Standard)
2	With thermowell：R 1/2 Double socket
3	With thermowell：1/2 NPT Double socket
4	With thermowell：G 1/2 Double socket
5	With thermowell：R 3/4 Double socket

Please refer to next page for themowell. (S W□□)

2 Connection

0	Union type
1	Slide type (Balb 16 Dia. is not available)
4	Plain type

Bulb bend type is available

3 Connection

0	R 1/2
1	R 3/4
2	1/2 NPT
3	G 1/2 B
4	G 3/4 B
5	JIS10K20ARF
6	JIS10K25ARF
7	ANSI1B150RF
8	ANSI1B300RF
A	Fixing screw (W22 thread 4) Union type only
Z	Plain type

15 Document

0	Nil
1	Please specify your requirement Drawing one sheet, Instruction manual, Inspection procedure, Mill sheet, Test report

14 Other additional spec.

0	Nil
1	Please specify your requirement Case finishing・Dual scale with (°F) Bulb・Connection 316st.st. option

In case of TS30・TS50

12 Outlet for electric wire

7	Gland JIS 20 b

Selection spec. / Additional spec. (Option)

T 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Type No.

4 Setting range (℃)

1	0～50, 60, 80, 100, 120, 150
2	0～200, 250, 300
3	−10～50, −20～100, −30～50, −10～100
4	−70～50, −70～100, −50～50 (Liquid filled type)

5 Bulb Dia.

1	d＝8 Dia.
2	d＝10 Dia.
3	d＝12 Dia.
4	d＝13 Dia.
5	d＝16 Dia.

6 Bulb length

1	From min. insertion length to 500 mm
2	505 mm～ 1000 (8 DIA., 16 DIA.) 3000 (Other)

Please specify bulb length

7 Lead kind

1	Capillary：304st.st., Armored tube：430st.st.
2	Capillary：316st.st., Armored tube：430st.st.
3	Capillary：304st.st., Armored tube：430st.st.+PVC (To 100℃)
4	Capillary：316st.st., Armored tube：430st.st.+PVC (To 100℃)

8 Lead length

1	To 3m
2	More than 3m

Please specify lead length

9 Compensation

1	Bimetal compensation (Mercury filled type)
2	Lead compensation (Liquid filled type)

10 Type of contact point

1	H：Upper limit type with one contact
2	L：Lower limit type with one contact
3	H L：Upper and lower limit type with two contact (TS50)
4	2 H：Upper limit type with two contact (TS50)
5	2 L：Lower limit type with two contact (TS50)
B	H L R：Center part setting type with two contact (TS50)

11 Type of outlet

2	Gland type (T S 30・50 only)

13 Treatment

0	Nil
1	Use no oil
2	Use no water
3	Use no oil・water

※When placing an order, check to confirm the specifications including a madel, setting range, bulb, a lead parts, etc. and then select a model number.